NATIONAL INSTITUTE OF TECHNOLGY PATNA
DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING
End Semester Examination May 2022

B. Tech: Semester - 6
Course Name: Software Engineering ***Course Code: CS6402***
Maximum Time: 3 Hours **Max. Marks: 60**

Instructions:

1. ***Answer all questions. Answer to sub questions must be given sequentially at one place.***
2. Not following above instruction may attract penalty.
3. Assume any suitable data, if necessary.
4. The Marks, CO (Course Outcome) and BL (Bloom's Level) related to questions are mentioned on the right-hand side margin.

S.No	Question	Marks	CO	BL
1	a) Outsourcing a module can be basically considered under _____ feasibility.	1	CO-1	1
	b) _____ is the first metric that is estimated before computing any other metrics.	1	CO-2	2 2
	c) In Mutation testing, if the mutant is found to be alive even after all the test cases have been exhausted, the _____ is done to kill the mutant.	1		1
	d) The main objective of code walkthrough is to _____ in the code.	1	CO-4	3
	e) Suppose you are the project manager of a software project requiring the following activities.	4		1

Activity No.	Activity Name	Duration (weeks)	Immediate predecessor
1	Obtain requirements	4	-
2	Analyze operations	4	-
3	Define subsystems	2	1
4	Develop database	4	1
5	Make decision analysis	3	2
6	Identify constraints	2	5
7	Build Module 1	8	3,4,6
8	Build Module 2	12	3,4,6
9	Build Module 3	18	3,4,6
10	Write report	10	6
11	Integration and test	8	7,8,9
12	Implementation	2	10,11

What is the maximum duration that the project can be delayed and which activity can be delayed?

f) For a module to be functionally independent it has to have _____ cohesion and _____ coupling. 1 2

i) Coincidental, Data
ii) Coincidental, Content
iii) Functional, Data
iv) Functional, Content

g) _____ represents the objects and its relationships appearing in the problem domain. 1 1

	h) Activity diagram and deployment diagram comes under the _____ and _____ view.	2		2
2	a) As a part of maintenance for a particular project, 40 KLOC are added and 20 KLOC are deleted annually. If the total development cost of the project is 400 PMs and the total KLOC is 400, compute the Annual Change Traffic (ACT) and Maintenance cost.	2	CO-4	3
	b) Github and Apache JMeter are case tools used for _____ and _____ purpose.	2	CO-5	4
	c) Briefly list and describe the characteristics of a good user interface.	4		1
	d) Analyse and explain how mutation-based testing is different from error seeding method.	2	CO-4	4
	e) What is the difference between Aggregation and Composition relationship? Give an example for each.	2		2
3	a) Compare and contrast the Scrum approach to project management with conventional plan-based approaches. The comparisons should be based on the effectiveness of each approach for planning the allocation of people to projects, estimating the cost of projects, maintaining team cohesion and managing changes in project team membership.	4	CO-3	4,5

	b) For the given program fragment,
	z =0;
	while x>0
	z = z+y;
	x = x-1;
	end while;
	print z;
	
	Compute the following Halstead's Software metrics
	i) Program length
	ii) Program vocabulary
	iii) Program volume
	iv) Programming effort
	v) Potential minimal volume
	vi) Programming time.
		6	CO-4	5

	c) Demonstrate what is meant by balancing a DFD with an example.	2		3
4	Generate structured analysis and structured design to develop a software to automate the activities of a small automobile spare parts shop. The small automobile spare parts shop sells the spare parts for a vehicle of several makes and models. Also, each spare part is typically manufactured by several small industries. To stream line the sales and supply ordering, the shop owner has asked us to develop the following motor part shop software. The software is called as Motor Part Shop Software (MPSS). The motor parts shop deals with large number of motor parts of various manufacturers and various vehicle types. Some of the motor parts are very small and some are of reasonably large size. The shop owner maintains different parts in wall mounted and numbered racks. The shop owner maintains a few inventory for each item as reasonable, to reduce inventory overheads after being inspired by the just-in-time(JIT) philosophy.	9+3	CO-4,6	3,4,6

	Thus, one important problem the shop owner faces is to be able to order items as soon as the number of items in the inventory reduces below a threshold value. The shop owner wants to maintain parts to be able to sustain selling for about one week. To calculate the threshold value for each item, the software must be able to calculate the average number of parts sales for one week for each part. At the end of each day, the shop owner would request the computer to generate the items to be ordered. The computer should print out the part number, the amount required and the address of the vendor supplying the part. (Note: - while performing SA show the decomposition upto level 2 and show the steps of SD)			

5	a) Consider the following C function named sort:
	/* sort takes an integer array and sorts it in ascending order */
	void sort(int a[], int n){
	int i, j;
	for(i=0;i<n-1; i++)
	for (j =i+1; j<n; j++)
	if(a[i]>a[j])
	{
	temp =a[i];
	a[i] = a[j];
	a[j] = temp;
	}
	}
	i) Determine the McCabe's cyclomatic complexity of the sort function.
	ii) Design a test suite for the function sort using the following white-box testing strategies (show the important steps in your test suite design method)
	• Statement coverage
	• Branch coverage
	• Condition coverage
	• Path coverage.
		1+4	CO-5	4, 5, 6

	b) Design black-box test suite for the following program. The program accepts two pairs of coordinates (x_1, y_1), (x_2, y_2), (x_3, y_3), (x_4, y_4). The first two points (x_1, y_1) and (x_2, y_2) represent the lower left and upper right points of the first rectangle. The second two points (x_3, y_3) and (x_4, y_4) represent the lower left and upper right points of the second rectangle. It is assumed that the length and width of the rectangle are parallel to either the x-axis or y-axis. The program computes the points of intersection of the two rectangles and prints their points of intersection.	4	CO-6	5
	c) Compare the advantages and disadvantages of a reuse program based on component library and another based on an application generator.	3	CO-4	4